

UNCLASSIFIED

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Exhibit R-2

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
R0829 Energy Conservation (ADV)								
	2,714	2,796	-	-	-	-	-	-
R0838 Mobility Fuels (ADV)								
	2,043	2,154	1,713	1,880	1,928	2,323	2,366	2,410
R2868 Proton Exchange Membrane (PEM) Fuel Cells								
	1,921	4,401	-	-	-	-	-	-
R9206 Plasma Energy Pyrolysis								
	-	3,913	-	-	-	-	-	-
R9207 Thermally Activated Chiller/Heater								
	-	1,711	-	-	-	-	-	-
Total	6,678	14,975	1,713	1,880	1,928	2,323	2,366	2,410

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program supports projects to evaluate, adapt, and demonstrate energy related technologies for ship and aircraft operations to: (a) increase fuel-related weapons systems capabilities such as range and time on station; (b) reduce energy costs; (c) apply energy technologies that improve environmental compliance; (d) relax unnecessarily restrictive fuel specification requirements to reduce cost and increase availability worldwide; (e) provide guidance to fleet operators for the safe use of commercial grade or off-specification fuels when military specification fuels are unavailable or in short supply; and (f) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems. This program, and the companion PE 0604710N, Navy Energy Program (ENG) support the achievement of legislated, White House, Department of Defense and Navy Energy Management Goals. It also responds to direction from the Office of the Secretary of Defense, the Secretary of the Navy and the Chief of Naval Operations to make up-front investment in technologies that reduce future cost of operation and ownership of the fleet and supporting infrastructure.

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

B. PROGRAM CHANGE SUMMARY:

	FY 2002	FY 2003	FY 2004	FY 2005
FY 2003 President's Budget Submission:	6,963	5,060	5,156	5,286
Adjustments from FY 2003 President's Budget:				
Congressional Plus-Ups		10,250		
FY2002 SBIR	-152			
Post-Production R&D Continuation			-263	-332
NWCF Rate Adjustment			-10	-7
Non - S&T R&D Offset			-183	
ACTD Offsets			-31	-36
Execution Adjustment	-99	-23		
Cong. Rescissions/Adjustments/Undist.Reductions	-34	-150		
Pay Raise/Inflation Adjustments		-162	-39	-40
Program Termination			-2,917	-2,991
FY 2004/2005 President's Budget Submission:	6,678	14,975	1,713	1,880

PROGRAM CHANGE SUMMARY EXPLANATION:

Schedule: Not applicable
Technical: Project R0829 terminates in FY04.

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN
Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Project Number: R0829
Project Title: Energy
Conservation (ADV)

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
R0829 Energy Conservation (ADV)	2,714	2,796	-	-	-	-	-	-

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project improves the energy efficiency of Navy ships and aircraft, and thereby contributes to reduced operating costs and improved fleet sustainability and performance. Major efforts include work to increase the efficiency of aircraft engines; and develop improved hull drag reducing technologies and more efficient energy conversion systems for ships.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 02	FY 03	FY 04	FY 05
Shipboard Energy Conservation	2,114	2,796	-	-

This effort improves the energy efficiency of Navy ships by developing more efficient shipboard machinery and electrical systems and improved hull drag reducing technologies.

FY 2002 ACCOMPLISHMENTS:

- Screened candidate self-polishing copper/cobiocide hull coatings and applied best two to test ships for full scale trials.
- Completed LSD stern flap model tests and designed full scale flap for ship trial via PE 0604710N.
- Developed algorithms to link gas turbine digital engine, fuel and variable stator vane controls to optimize fuel consumption at all operating conditions for both propulsion and auxiliary power plants.
- Designed and procured variable speed drives for 2000 gallon per minute five pumps (LHA/LHD class) and LM2500 gas turbine engine cooling module fans.

FY 2003 PLANS:

- Complete full scale ship trials of self-polishing copper/cobiocide hull coatings.
- Complete development and testing of fuel consumption optimization algorithms for digital gas turbine engine control systems.
- Complete development and testing of variable speed drives for 2000 gallon per minute five pumps and LM2500 gas turbine engine cooling module fans.

FY 2004 PLANS: Not applicable

R-1 Line Item 68
Page 3 of 11

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN
Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Project Number: R0829
Project Title: Energy
Conservation (ADV)

FY 2005 PLANS: Not applicable

	FY 02	FY 03	FY 04	FY 05
Aircraft Energy Conservation	600	-	-	-

This effort improved the fuel efficiency of Naval aircraft by developing improved components and materials for retrofit to existing aircraft engines.

FY 2002 ACCOMPLISHMENTS:

- Instrumented and tested a new high pressure compressor and turbine which was designed by this program and manufactured with GE Internal Research and Development funds. These components will be installed in the GE23a demonstration engine and are intended for use in growth versions of the F414 (F/A18-E/F) engine.

FY 2003 PLANS: Not applicable

FY 2004 PLANS: Not applicable

FY 2005 PLANS: Not applicable

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:

PE 0601153N (Defense Research Sciences)
PE 0602236N (Warfighter Sustainment Applied Research)
PE 0603236N (Warfighter Sustainment Advanced Technology)
PE 0603513N (Shipboard Systems Component Development)
PE 0603573N (Advanced Surface Machinery Systems)
PE 0603721N (Environmental Protection)
PE 0604710N (Navy Energy Program (ENG))

NON-NAVY RELATED RDT&E: Not applicable

D. ACQUISITION STRATEGY: Not applicable

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN
Exhibit R-3

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Project Number: R0829
Project Title: Energy
Conservation (ADV)

A. PROJECT COST BREAKDOWN: (\$ in thousands)

Project Cost Categories	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
a. System Development and Integration	2,714	2,796	-	-

B. BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: Not applicable.

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Project Number: R0838
Project Title: Mobility
Fuels (ADV)

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
R0838 Mobility Fuels (ADV)	2,043	2,154	1,713	1,880	1,928	2,323	2,366	2,410

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides data through engine and fuel system tests which relate the effects of changes in Navy fuel procurement specification properties to the performance and reliability of Naval ship and aircraft engines and fuel systems. This information is required to: (a) determine the extent to which unnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide; (b) provide guidance to fleet operators for the safe use of off-specification or commercial grade fuels when military specification fuels are unavailable or in short supply; and (c) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry. Recent problems with fuel quality have adversely affected ship and aircraft system performance and reliability and resulted in degradation of fuel in storage. The resulting readiness impacts, additional maintenance costs, and the cost of lost equipment, although difficult to quantify, are many times the cost of this project. Over the next decade, the potential for fuel quality related problems will increase because of changing industry practices required to comply with new environmental regulations. This project represents the only investment designed to maintain the Navy's ability to operate as a "smart" customer for fuels that cost over \$2B per year to procure, transport, store and consume and are essential to fleet operations.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 02	FY 03	FY 04	FY 05
Ship Fuels	976	1,100	980	1,050

Performs development, test and evaluation work for Navy ship fuels to: (a) determine the extent to which unnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide; (b) provide guidance to fleet operators for the safe use of off-specification or commercial grade fuels when military specification fuels are unavailable or in short supply; and (c) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry.

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Project Number: R0838
Project Title: Mobility
Fuels (ADV)

FY 2002 ACCOMPLISHMENTS:

- Continued testing of Navy gas turbine, high-and medium-speed diesel engine fuel injection systems, and shipboard fuel handling systems with low-lubricity ship diesel fuels. Test results will be used to specify minimum lubricity levels and test methods to be used for fuel acceptance.
- Continued evaluation of lubricity enhancing additives for use with Navy distillate fuels.
- Initiated phase II assessment of the feasibility of specifying JP-5 as the single fuel for use by all Naval Systems (ships, aircraft and ground equipment).
- Initiated development of a commercial fuel specification that will satisfy Navy ship fuel requirements.

FY 2003 PLANS:

- Complete testing of Navy gas turbine, high-and medium-speed diesel engine fuel injection systems, and shipboard fuel handling systems with low-lubricity ship diesel fuels. Use results to specify minimum lubricity levels and test methods to be used for fuel acceptance.
- Complete assessment of the feasibility of specifying JP-5 as the single fuel for use by all Naval Systems (ships, aircraft and ground equipment).
- Complete the evaluation of lubricity enhancing additives for use with Naval distillate fuels.
- Initiate review of F-76 Naval ship fuel specification and test requirements to determine and remove any unnecessary requirements to increase availability.
- Continue development and acceptance of a commercial fuel specification.

FY 2004 PLANS:

- Conduct field trial of JP-5 single fuel initiative.
- Complete F-76 specification and test requirements evaluation to determine and remove any unnecessary requirements to increase availability.
- Complete development and acceptance of commercial fuel specification.
- Initiate development of an equipment/fuel qualification procedure to evaluate utilization of synthetic and ultra clean, low sulfur fuels.

FY 2005 PLANS:

- Continue development of a qualification procedure to evaluate and approve utilization of synthetic and ultra clean, low sulfur fuels.
- Initiate development of sensors and instruments to determine composition of blended marine gas oils, diesel fuels and jet fuels.

R-1 Line Item 68
Page 7 of 11

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Project Number: R0838
Project Title: Mobility
Fuels (ADV)

	FY 02	FY 03	FY 04	FY 05
Aircraft Fuels	1,067	1,054	733	830

Performs development, test and evaluation work on Navy aircraft fuels to: (a) determine the extent to which unnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide; (b) provide guidance to fleet operators for the safe use of military aircraft fuels that include new additives or are from new sources including synthetics; and (c) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry.

FY 2002 ACCOMPLISHMENTS:

- Completed evaluation of the impact of copper contaminated fuel and +100 thermal stability improving additives on Naval Joint Strike Fighter engine performance and maintenance requirements.
- Initiated JP-5 specification requirements and specification test review to determine and remove unnecessary requirements and increase worldwide availability.
- Evaluated prototype shipboard fuel contamination and free water detection equipment.
- Continued T45 +100 additive field evaluation.

FY 2003 PLANS:

- Continue development and evaluation of fuel copper contamination removal system.
- Complete JP-5 specification and test method review.
- Complete JP-5 +100 fuel T45 field evaluation.
- Conduct shipboard trial of in-line automated fuel contamination and free water detection equipment.
- Evaluate impact of +100 additive on reducing aircraft emissions.

FY 2004 PLANS:

- Field trial fuel copper contamination removal system.
- Initiate development of an equipment/fuel qualification procedure to evaluate and approve utilization of synthetic aircraft fuels.

FY 2005 PLANS:

- Continue the development of a qualification procedure to evaluate and approve utilization of synthetic fuels.
- Initiate the development and evaluation of shipboard compatible stability and performance improving additives.

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Project Number: R0838
Project Title: Mobility
Fuels (ADV)

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:
PE 0601152N (In-House Laboratory Independent Research)
PE 0205633N (Aviation Improvements)

NON-NAVY RELATED RDT&E: Not applicable

D. ACQUISITION STRATEGY: Not applicable

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN
Exhibit R-3

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Project Number: R0838
Project Title: Mobility
Fuels (ADV)

A. PROJECT COST BREAKDOWN: (\$ in thousands)

Project Cost Categories	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
a. Reliability, Maintainability and Availability	2,043	2,154	1,713	1,880

B. BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: Not applicable.

UNCLASSIFIED

UNCLASSIFIED

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: February 2003

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Project Number: R2868
Project Title: Various
Congressional Plus-Ups

Congressional Plus-Ups:

R2868	FY 02	FY 03
Proton Exchange Membrane (PEM) Fuel Cells	1,921	4,401

Demonstrate PEM fuel cells from domestic manufactures at Department of the Navy installations.

R9206	FY 02	FY 03
Plasma Energy Pyrolysis (PEPS)	-	3,913

Demonstrate plasma energy pyrolysis technology to destroy waste aboard Navy ships.

R9207	FY 02	FY 03
Thermally Activated Chiller/Heater	-	1,711

Assess the suitability of thermally activated chiller/heater units for use at the Department of the Navy shore installations.

UNCLASSIFIED